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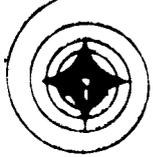
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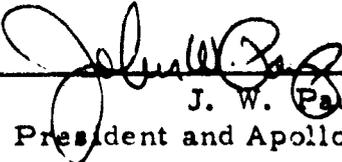
**MOCKUP NO. 19, COMPLETE  
APOLLO SPACECRAFT  
(UNCLASSIFIED)**

NAS 9-150

28 February 1962 *4.5.2.7*



Approved by

  
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J. W. Paup  
Vice President and Apollo Program Manager

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## 1. SCOPE

1.1 Scope. - This specification covers the requirements for a Complete Spacecraft Mockup for the Project Apollo Spacecraft.

## 2. APPLICABLE DOCUMENTS

2.1 General. - The following documents shall form a part of this specification.

### Government Documents

#### Bulletins

ARDCM-80-1, Volume 1

Handbook of Instructions  
for Aircraft Designers

## 3. REQUIREMENTS

3.1 Mockup Configuration. - The Complete Spacecraft Mockup shall consist of the Launch Escape Tower, Command Module, Service Module, and Adapter. The configuration of the complete spacecraft mockup shall be as shown on figure 1. The configuration of each individual mockup shall be as specified herein.

3.1.1 Launch Escape Tower. - The launch escape tower and sub-systems shall be simulated and installed on the command module.

3.1.2 Command Module. - The command module shall contain systems and equipment as listed in the appendices and as follows:

(a) Equipment Bays

1. Upper Equipment Bay
2. Lower Equipment Bay (figure 3)
3. Left Hand Equipment Bay (figure 4)
4. Right Hand Equipment Bay (figure 5)

(b) Lighting Fixtures

(c) Watch Stations and Equipment

(d) Airlock and Docking System (figure 6)

(e) Viewing Ports



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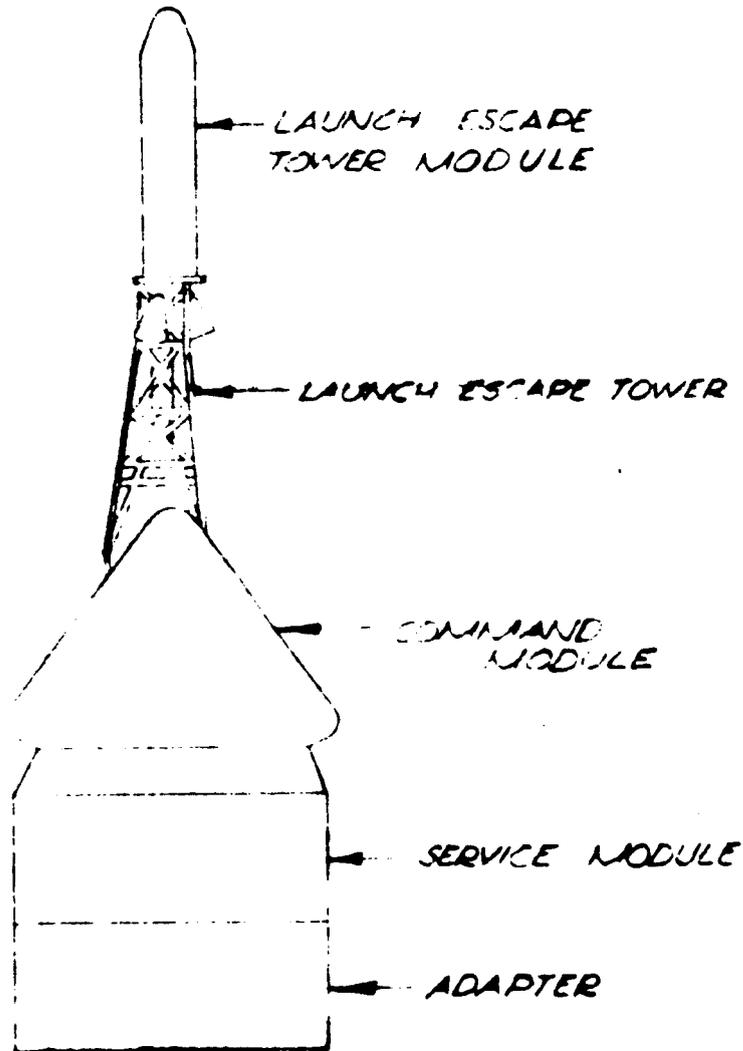


Figure 1. Overall Configuration

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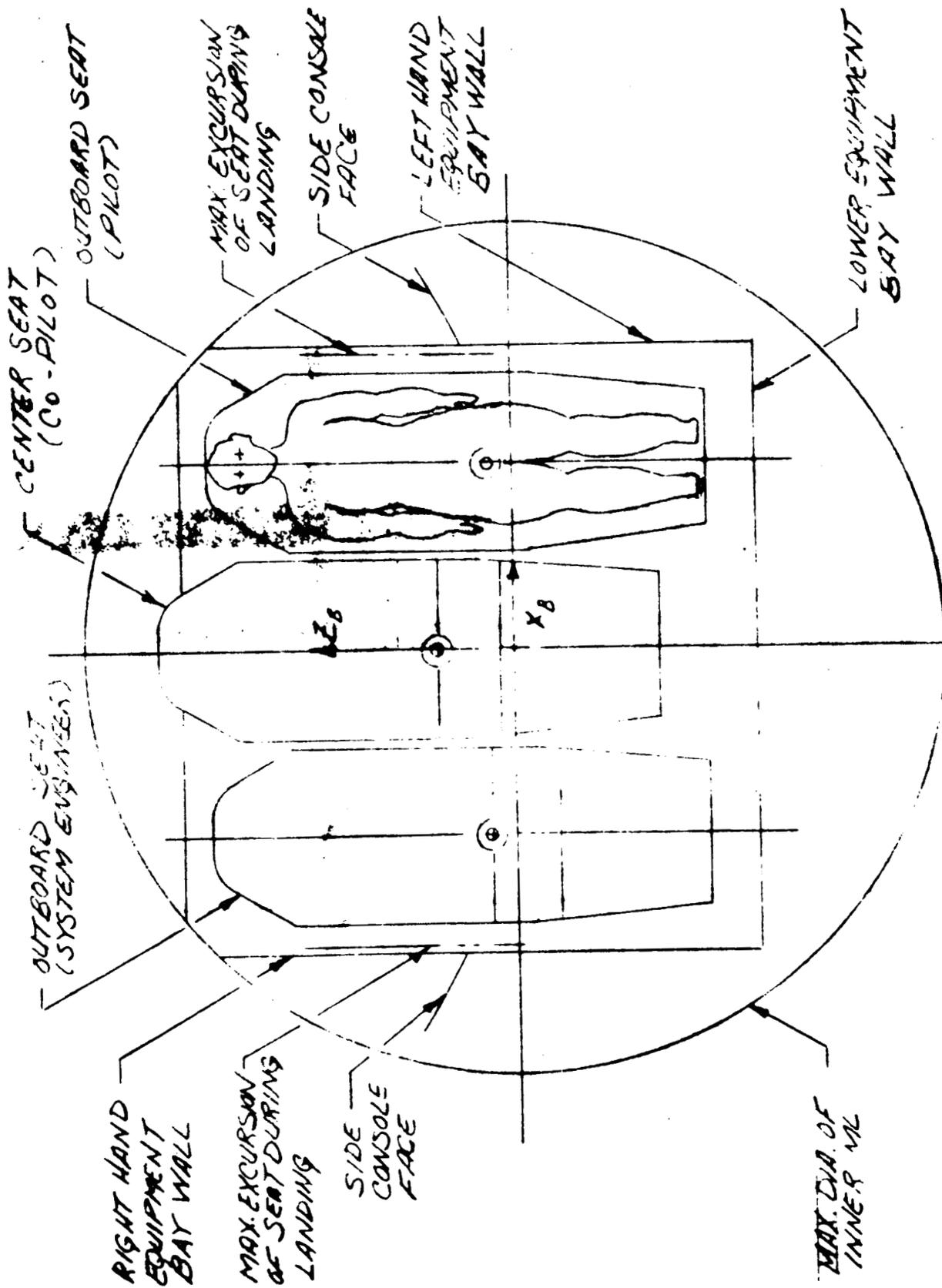


Figure 2. Position of Crew During Boost and Re-entry

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TELECOMMUNICATION ELECTRONIC MODULE

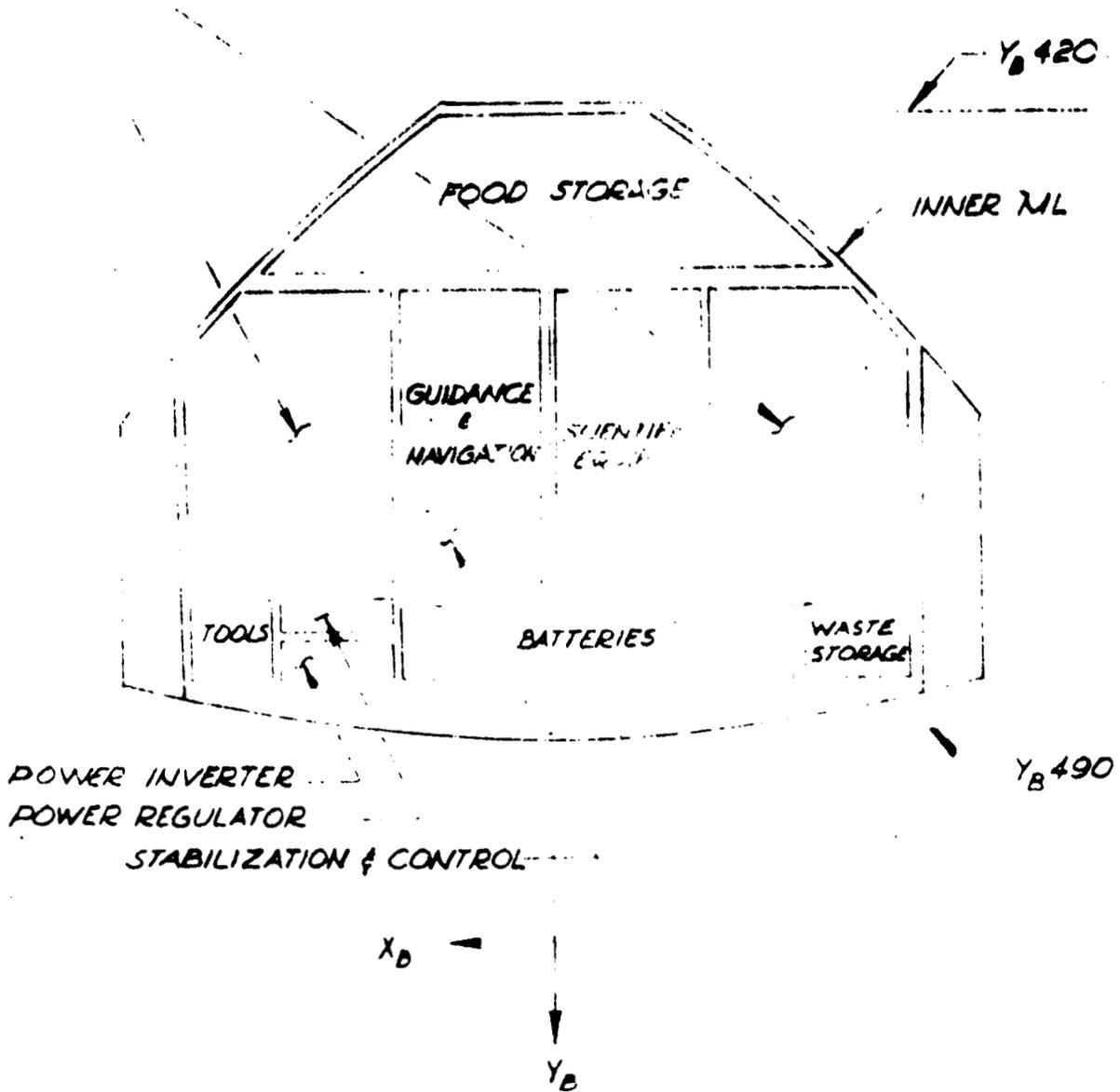


Figure 3. Lower Equipment Bay

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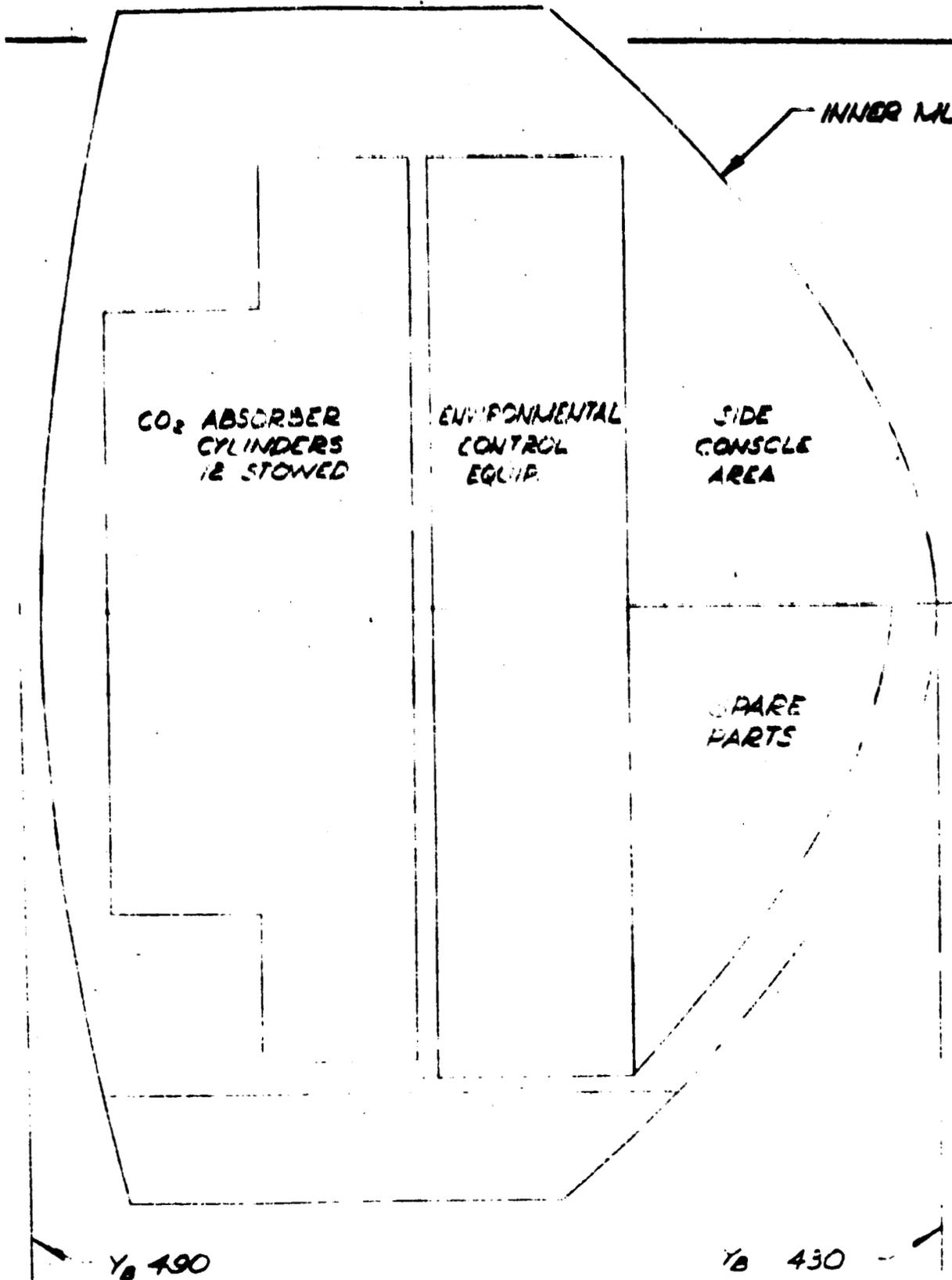


Figure 4. Left Hand Equipment Bay

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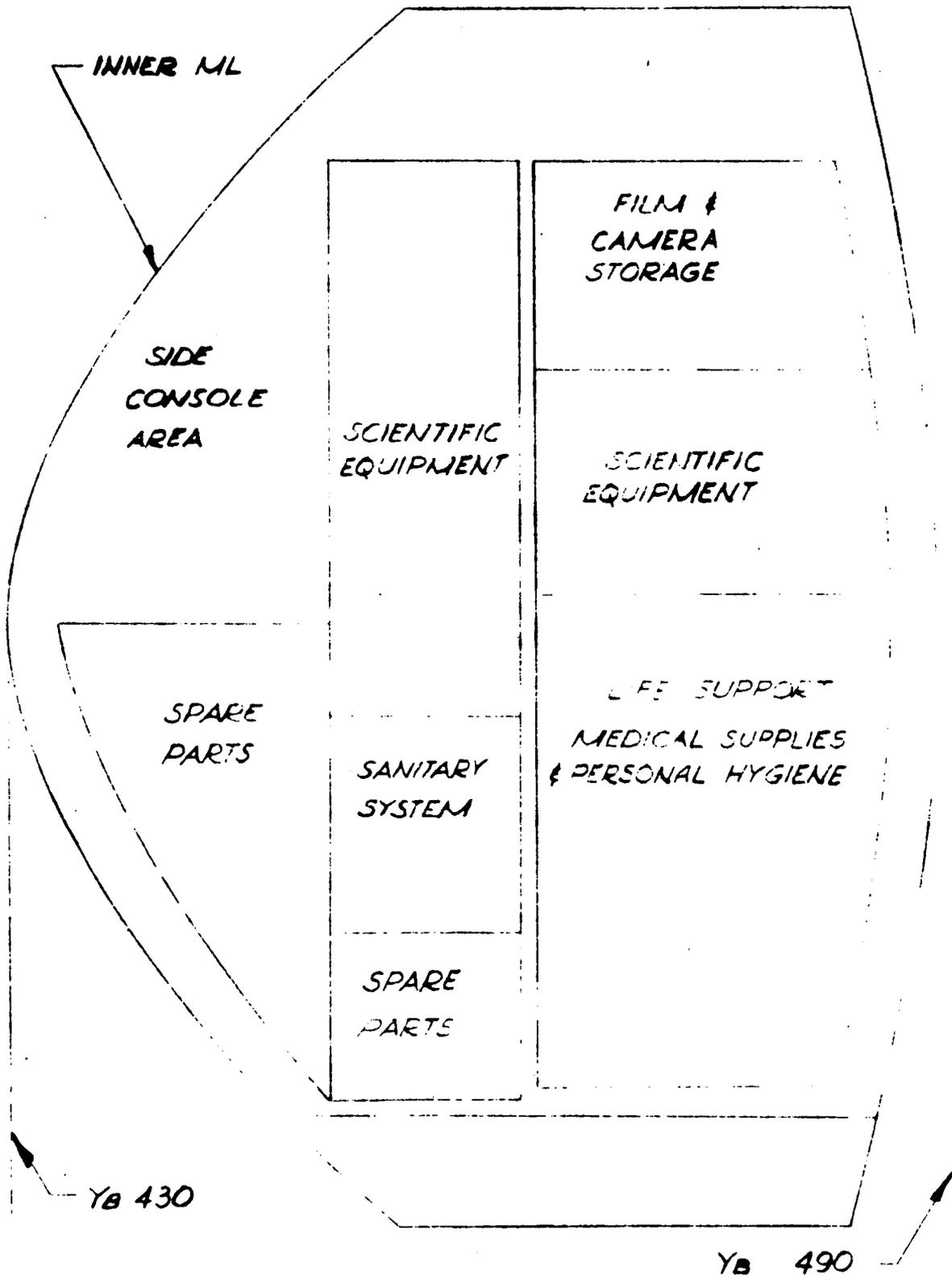


Figure 5. Right Hand Equipment Bay

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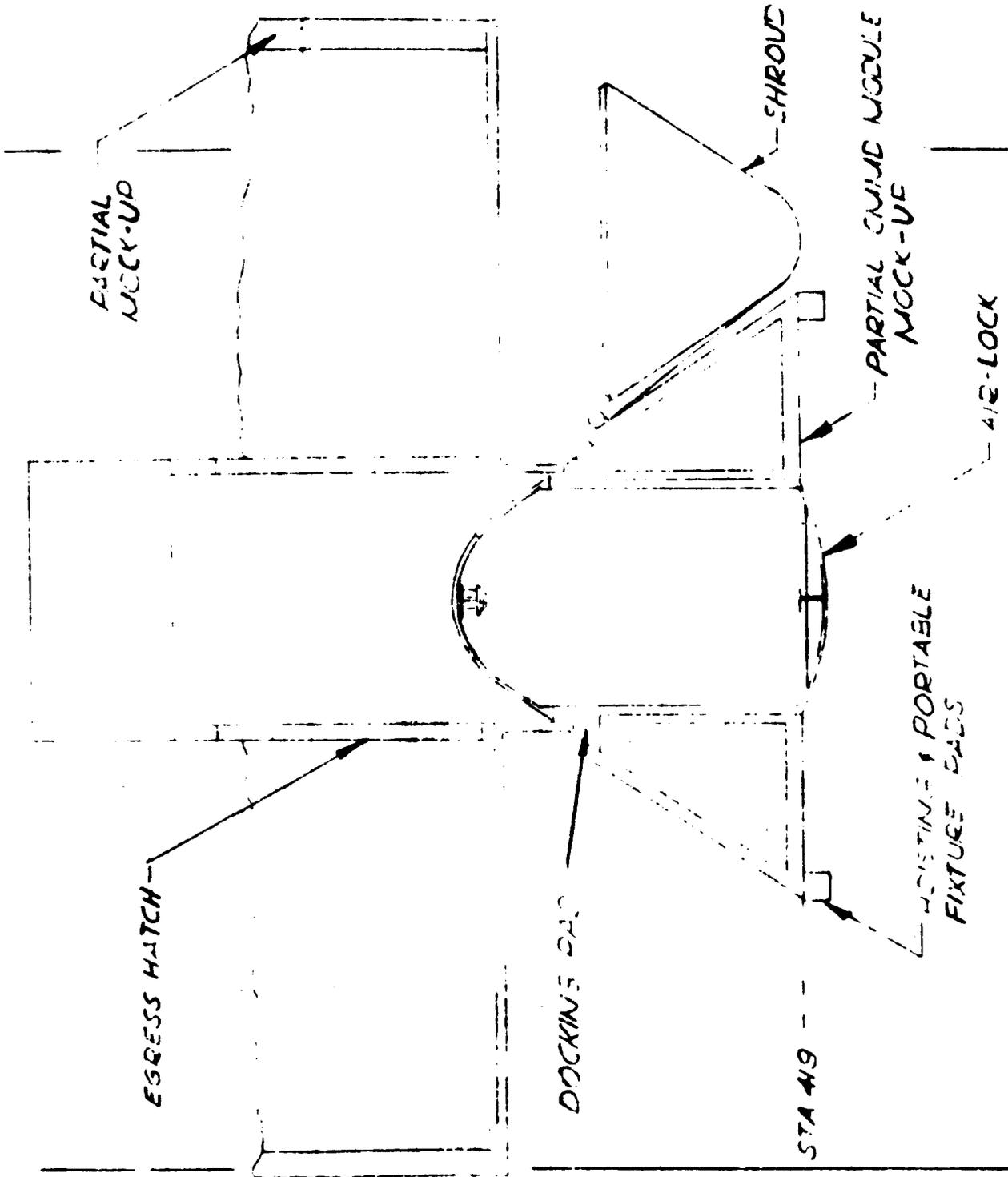


Figure 6. Airlock and Docking Section

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(f) Couches (Figure 2)

The general arrangement of equipment bays and equipment shall be as shown on figures 7 and 8. The command module overall dimensions, viewing ports and ingress/egress hatch shall be as shown on figure 9.

3.1.2.1 Airlock and Docking System. - The airlock and docking system shall be a prototype article installable in the command module.

3.1.3 Service Module. - The service module shall contain equipment and systems as listed in the appendices.

3.1.4 Adapter. - The adapter shall contain equipment as listed in the appendices. The adapter shall include any external protrusions that may affect mating processes.

3.1.5 Mating. - The launch escape system, command module, service module and adapter shall simulate mating devices and connections.

3.2 Construction. - Materials and processes used in the construction of the mockup shall provide an inexpensive mockup of the spacecraft. Materials used shall support the required installations and shall withstand handling and transportation. Assemblies, parts and components of the mockup shall be either rejected items of equipment, prototypes, or reasonable facsimiles, fabricated to the size and shape of the actual equipment. ARDCM-80-1, Volume 1 shall be used for guidance and reference in the design and construction of the mockup.

3.3 Performance. - The Complete Spacecraft Mockup shall provide a means to evaluate the space requirements and compatibility of the equipment to be used in the spacecraft. The mockup shall provide a means for engineering evaluation of new and proposed design changes. The mockup shall be required to accommodate ground handling equipment.

4. QUALITY ASSURANCE PROVISIONS - Not Applicable

5. PREPARATION FOR DELIVERY

5.1 Mockup Delivery. - Ground handling equipment shall be provided to transport, demonstrate and handle the mockup without damage.

6. NOTES

6.1 General. - The mockup shall be used for design, functional and test evaluation.

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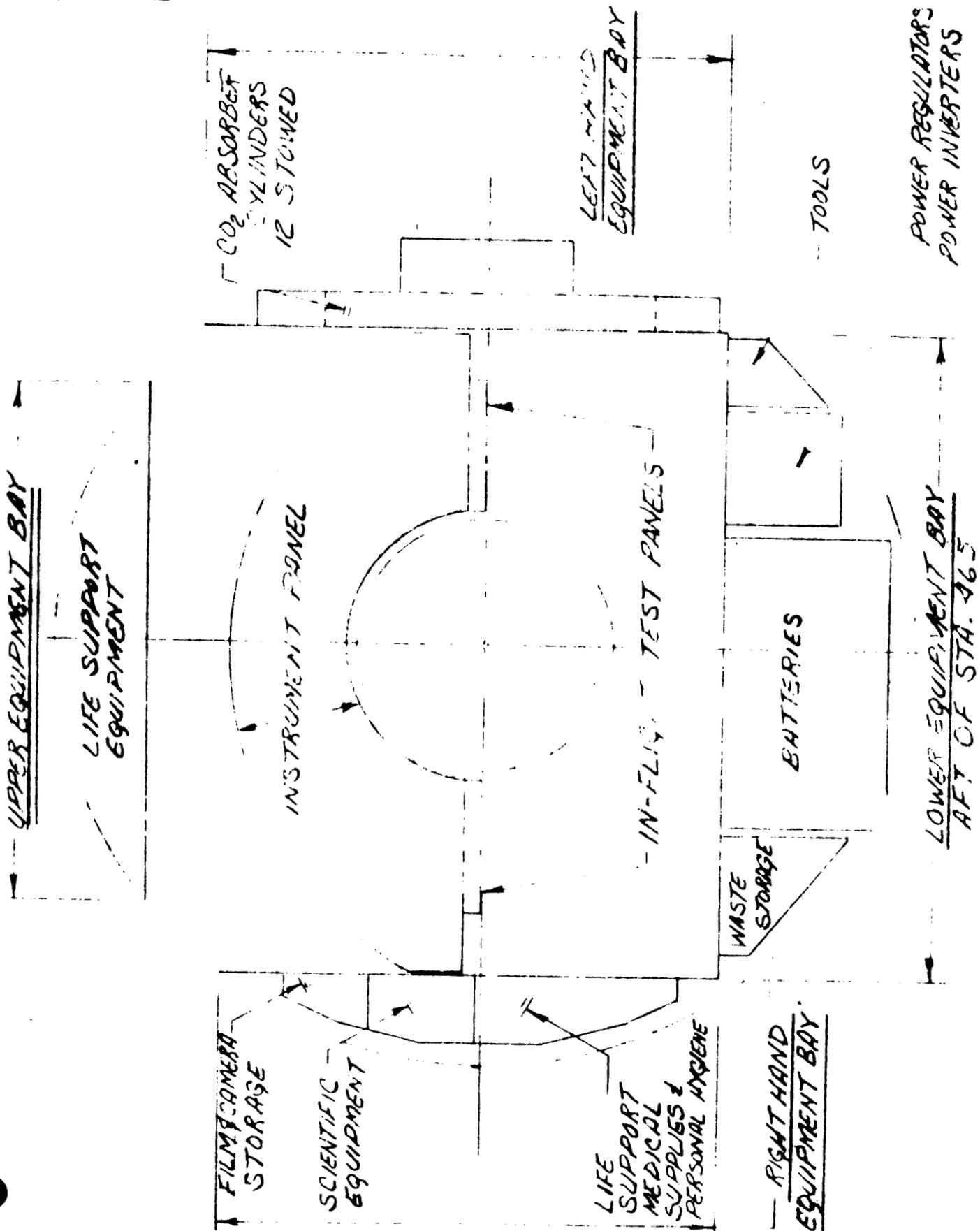


Figure 7. Equipment Bay Locations

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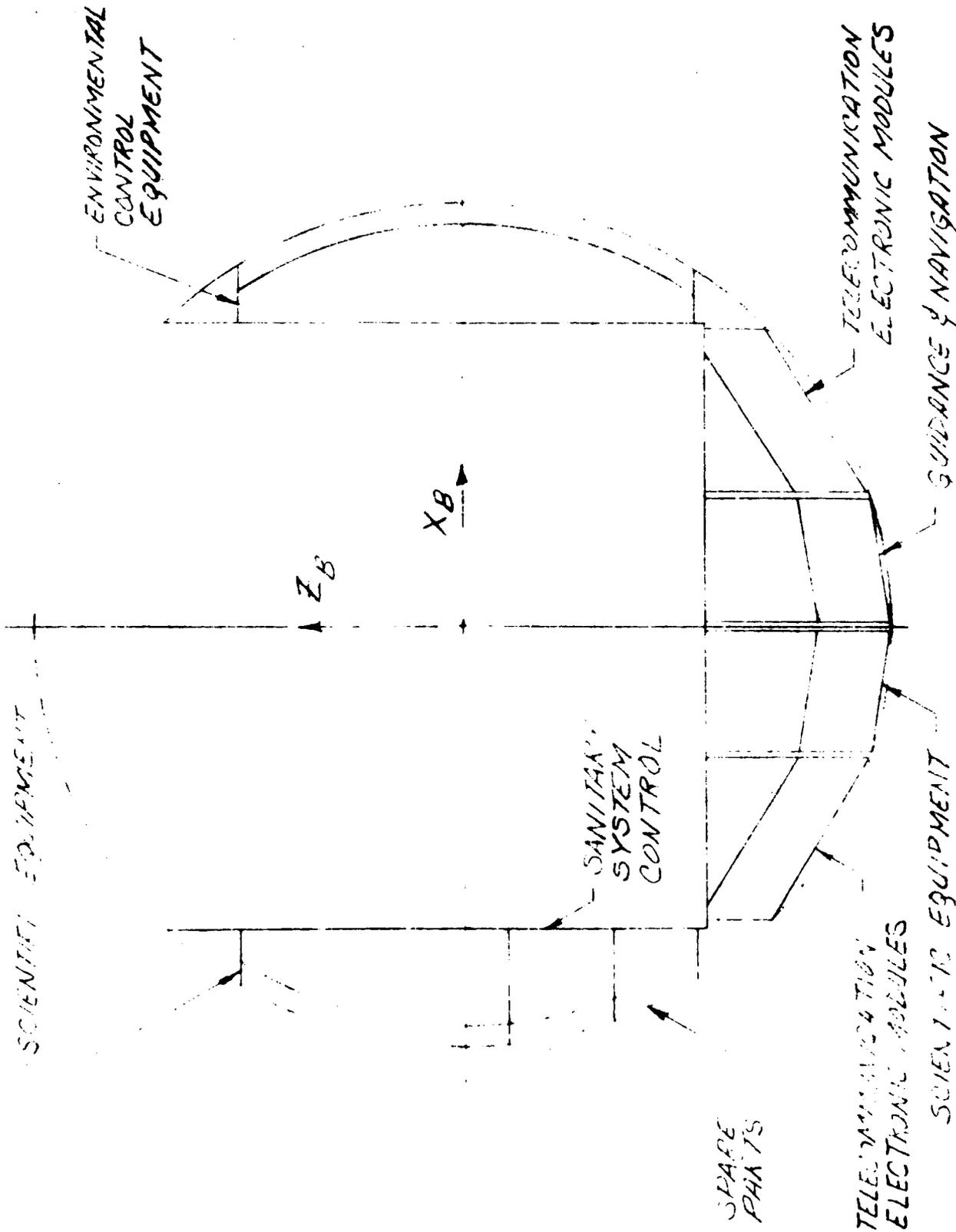


Figure 8. Center Equipment Aft of  $Y_B = 440$

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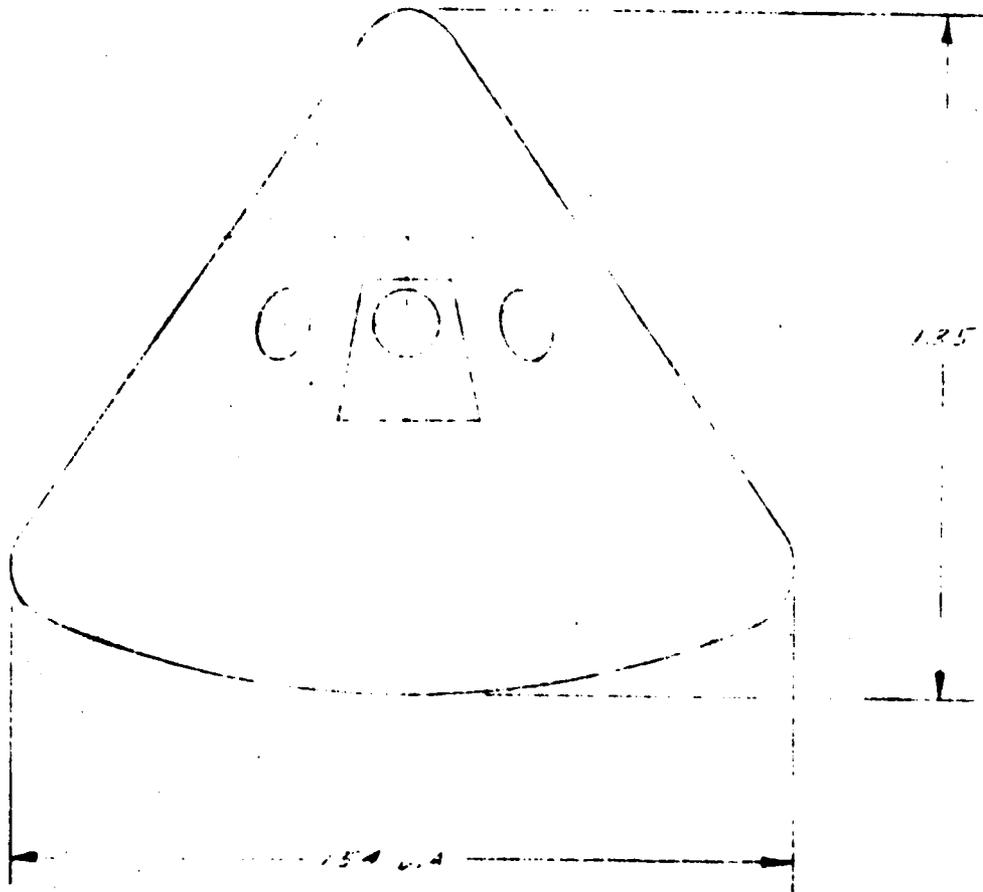


Figure 9. Command Module

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Appendix I-a

Government-Furnished Property, Contractor-Installed

<u>Item No.</u>	<u>Quantity</u>	<u>Description</u>	<u>Part No.</u>
1		Pressure Suits	
2		First Aid Equipment	
3		Recreational Equipment	
4		Portable Life Support Equipment	

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Appendix II-a

Contractor-Furnished Equipment, Contractor-Installed

<u>Item No.</u>	<u>Quantity</u>	<u>Command Module</u>	<u>Description</u>	<u>Part No.</u>
			Environment Control System	
			a. pressure suit circuit subsystem	
			b. water glycol circuit subsystem	
			c. command module pressure and temperature control subsystem	
			d. oxygen supply subsystem	
			e. water supply subsystem	
			f. E.C.S. console display	
			g. gas analyzer	
			Guidance and Control System	
			a. navigation and guidance subsystem	
			b. stabilization and control subsystem	
			c. guidance and control instrument panel	
			Reaction Control System	
			Earth Landing System	

1

2

3

4

~~CONFIDENTIAL~~Appendix II-aContractor-Furnished Equipment, Contractor-Installed

<u>Item No.</u>	<u>Quantity</u>	<u>Command Module</u> <u>Description</u>	<u>Part No.</u>
5		Mechanical Systems	
		a. interstage disconnect mechanism	
		b. umbilical devices	
		c. handling and transportation attachments	
		d. hatches and doors	
6		Airlock and Docking System	
7		Structural and Heat Protection System	
		a. meteoroid shield	
8		Electrical Power System	
		a. power regulation and inverters	
		b. recovery battery	
		c. electrical disconnects	
9		Communications System	
		a. telemetry subsystem	
		b. antenna subsystem	

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Appendix II-aContractor-Furnished Equipment, Contractor-Installed

<u>Item No.</u>	<u>Quantity</u>	<u>Command Module</u> <u>Description</u>	<u>Part No.</u>
		c. radar and rescue subsystem	
10		Instrumentation System	
		a. sensors	
		b. transducers	
		c. cameras	
		d. telescope	
		Abort System	
11		Crew Support System	
12		a. couches	
		b. shock and vibration mitigation subsystem	
		c. crew restraint subsystem	



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Appendix II-a

Contractor-Furnished Equipment, Contractor-Installed

<u>Item No.</u>	<u>Quantity</u>	<u>Service Module</u> <u>Description</u>	<u>Part No.</u>
1		Environmental Control System a. water-glycol circuit subsystem b. service module pressure and temperature control subsystem c. oxygen supply subsystem d. lunar supplemental refrigeration subsystem	
2		Reaction Control System	
3		Vernier Propulsion System	
4		Mission Propulsion System	
5		Communications System a. antenna system b. transmitters and receivers	
6		Guidance and Control System a. stabilization and control subsystem	

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Appendix II-a

Contractor-Furnished Equipment, Contractor-Installed

<u>Item No.</u>	<u>Quantity</u>	<u>Service Module</u> <u>Description</u>	<u>Part No.</u>
7		Mechanical System a. interstage disconnect mechanism b. umbilical devices c. handling and transportation attachments d. hatches and service doors e. radiators	
8		Structural System a. meteoroid shield	
9		Electrical Power System a. fuel cells b. hydrogen tanks	

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Appendix II-a

Contractor-Furnished Equipment, Contractor-Installed

<u>Item No.</u>	<u>Quantity</u>	<u>Adapter</u>	<u>Description</u>	<u>Part No.</u>
			Mechanical Systems	
			a. interstage disconnects	
			b. umbilical devices	
			c. hatches and doors	

1

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